

PRESIDENT'S ADDRESS

Delivered at the Seventy-Sixth Annual Meeting of the British Medical Association.

BY

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My first and most pleasing duty is to thank you for your kindness in placing me in the honourable and distinguished position of President of this great Association. To have one's name enrolled amongst the seventy-five eminent men who have preceded me in this office is indeed an honour which naturally can only come to few of the many thousands who are numbered in the British Medical Association.

It next devolves upon me to offer you a most cordial welcome, one and all, to this city. To you, residents in other parts of these islands, we, the medical practitioners of Sheffield, extend a hearty greeting; to our fellow-subjects from many distant lands, but under the same flag, we accord a motherland welcome; whilst to our guests, whether they be our kinsmen from across the Atlantic, or others from the various European States, we extend the right hand of fellowship. All are welcome to this city, and to partake of the scientific fare and the hospitalities which, with the help of our citizen friends, it has been our happiness to prepare.

The present is the third annual meeting of the Association in this city. At the first meeting, in 1845, the President-elect retired the day before, because, as he said, he was not in accord with the medical politics of the Association, whilst the next, in 1876,* was held at short notice in consequence of the abandonment of the meeting, owing to local differences, in another town which had been selected.

To-day, far-reaching questions of great importance are agitating the Association. Whatever be the outcome, let us hope that this, the greatest Association the members of any profession have ever seen, may in no measure depart from the high traditions it has ever set before it, but rather increase its usefulness to the profession, and if it does this it will be for the benefit of the public.

The first meeting was the thirteenth of the Association, which was then the Provincial Medical and Surgical Association, and was held in July, 1845. Dr. Charles F. Favell was the president and Dr. F. Branson the secretary. Such, however, is destiny, that the president only lived to the next year, passing away at the early age of 42, whereas Dr. Branson attained the age of 82, and died only twelve years since. Dr. Favell was the representative of a medical family already then well known and respected for generations in the city. His nephew, William F. Favell, delivered the Address in Surgery in this city in 1876, and another nephew is worthily presiding over the Gynaecological Section at this meeting.

It is interesting to note that in his farewell address (1845) the retiring President, Dr. Robertson of Northampton, predicted a long and prosperous career for this Association. These were his words:

Our Association, I trust, is destined to experience a very long career of existence, increasing from year to year, till it reaches the full stature and importance of a national institution. May be permitted to look at it in imagination through the long vista of distant futurity, and to apostrophize it in the well-known words of one of our classical poets?

"O! while along the stream of time thy name
Expanded flies, and gathers all its fame;
Say, shall my little bark attendant sail
Pursue the triumph, and partake the gale?"

POPE: *Moral Essay.*

How true has this prophetic vision become! These words were spoken in this city sixty-three years ago at a time when the Provincial Medical and Surgical Association, as it was then named, numbered less than 1,900 members, whereas the British Medical Association of 1908 numbers more than 22,000 members, and its far-reaching character is such that it is limited only by the confines of the British Empire, serving not only as a bond between medical brethren in different parts, but as a link in the chain of imperial unity. To-day we have gladly welcomed as our guests numerous representatives from many different climes and many distant countries, all members

of this great Association, and all owing allegiance to the same Sovereign.

At the second meeting, in 1876, the British Medical Association had increased its membership to 7,000, and the population of this city was 260,000, it having more than doubled the number of its inhabitants since the previous meeting in 1845.

Let me here say something of the changes which have come over Sheffield. The town has become a city, and is shortly to be the centre of an episcopal diocese. The main streets have given place to others, wide and open; many very fine buildings worthy of a great city have arisen, notably the town hall and the university. Hospital extension has gone on apace, no less a sum than more than £250,000 having been spent at the four institutions,† either in alterations and extensions or on the erection of new buildings. The large works of world-wide reputation have become more extensive, and have done more than ever to maintain the pre-eminence of the city as the metropolis of the steel industry. The population has reached to nearly half a million, and a healthy public spirit has been abroad, making Sheffield one of the most progressive and prosperous cities of the kingdom. It has been fortunate in its public men, in their character and ability, from whichever side of political life they have been drawn; and fortunate, too, that they, when an undertaking has been manifestly for the public good, have been enabled to sink their differences and work together for the general weal.

The Sheffield School of Medicine ranks among the oldest of similar institutions in this country. Shortly, its history is as follows:

An active and busy practitioner in the early part of the last century, Mr. Hall Overend, had collected together a museum, which, for those days, must have been a very extensive one. By 1827 his ideas, with the assistance of his son, Wilson Overend, and others, had developed into a School of Anatomy and Surgery, and a complete syllabus of lectures was issued. In 1835 (January 26th) a riot occurred and the school was burnt down, the populace believing, not without some reason, that resurrected bodies were therein.

Shortly after the foundation of this Overend School another medical institution was promoted on more ambitious lines, and on July 9th, 1828, the foundation stone was laid by Dr. (afterwards Sir) Arnold Knight. In the same month of the next year (July 2nd) this school was opened with an introductory address by the same eminent physician. At this period the population of Sheffield did not number 70,000, and the students that the promoters could expect were the apprentices in the town and neighbourhood. A local directory of the time gives 8 physicians and 33 surgeons as residing in the town, but some of these were not, I think, regular practitioners. It was, however, a time of considerable activity in medical quarters. A medical and surgical society had been established in 1819, and a medical library two years earlier. There is evidence also that, though the profession was few in numbers, it yet contained many active and able men. The Medical School, founded in 1828 by Sir Arnold Knight, pursued an uninterrupted career until, three years ago, it became the Medical Faculty of the University. Through good fortune or ill fortune the work of medical education was carried on in this city. At no time were the services of its lecturers pecuniarily recompensed, but such an *esprit de corps* was established that it may safely be asserted, the exceptions being so insignificant, that no medical practitioner has occupied a prominent position who, at one time or another in his career, has not rendered more or less service to the Medical School. Up to 1889 the original building was still occupied. Then the school was removed to a new

† The four institutions are (1) Royal Infirmary (255 beds), large alterations and extensions; (2) Royal Hospital (165 beds), rebuilding; (3) Jessop Hospital for Women (80 beds), rebuilt and extensions and (4) Children's Hospital (40 beds) new buildings.

* Dr. Bartolomé was President at this meeting; he died in 1889. The Local Secretaries were Mr. Arthur Jackson—he died in 1895; and Dr. Keeling, who is still living.

building, much more commodious, which served its purpose until the present university buildings were erected, the Medical Department of University College—as it had been for some years—becoming the Medical Faculty of the University. The last few years have seen professorships in anatomy, physiology, and pathology successfully founded and held by men devoting their energies entirely to those studies, whilst the primary subjects of physics, chemistry, and biology have been taught by the university science professors.

Holding our meetings in these buildings, you will have ample opportunity of becoming familiar with the advantages they afford for teaching purposes. What is true of our department is true of all, and it has been fortunate that those responsible for the management of the university have recognized that fit and proper equipment is an important part of endowment.

The subject of modern universities has been discussed over and over again, and it suffices to say that the university movement in Sheffield was a popular one in which all classes participated. The medical profession rendered its share in this movement. It is pleasing to note that, whilst the oldest of the Faculties, the Medical has renewed its youth and activity, and whilst it must of necessity be always smaller than such Faculties as that of Applied Science, admittedly pre-eminent for its special features amongst similar institutions, and can appeal, therefore, to immense numbers from all parts, yet with its large clinical opportunities and the excellent equipment of its laboratories it will continue to be a highly important Faculty in the most modern, but not the least progressive, of the universities.

Sheffield may perhaps not inappropriately be called the cradle of the study of industrial diseases. It was in 1830 that Sir Arnold Knight, one of the Physicians to the Royal (then General) Infirmary, published his paper¹ calling attention to the high mortality from lung diseases among grinders, but he had previously, in 1819, before the Medical and Surgical Society, read a paper on the same subject,² in which he showed that whilst there were several thousands engaged in that employment very few of them attained the age of 45, and fewer still survived it, but it was only of late years that this complaint had become so frequent among the grinders. He then went on as follows:

Until the beginning of the last century (eighteenth) grinding was not a distinct branch of business, but was performed by men who were also engaged in various other departments of the cutlery trade, and who were consequently exposed but seldom, and then only for a short time, to the injurious effects of the grinding wheel. Up to that time, also, the grinder's asthma was not known as a disease peculiar to the grinder; then, however, an important change took place in the division of labour, and grinding became the sole employment of the grinder. A few years afterwards, about the middle of the same century, several grinders were observed to die of complaints, nearly similar; the attention of their companions was aroused, and they found the complaint was peculiar to themselves; still, however, it was far from being general among them, for they worked in large, lofty rooms, which did not contain more than six or eight stones, were open to the roof, without windows, and generally with the cog-wheel in the inside; thus such a complete circulation of air was effected that the small quantity of dust raised from these few stones was soon carried away. Moreover, for several months during each summer they could not work more than four or five hours a day owing to a scarcity of water.* About thirty years ago (1786) the steam engine was first adapted to the purposes of grinding; and then a very important era arrived in the annals of the grinder. He now worked in a small low room where there were ten or twelve stones; the doors and windows were kept almost constantly closed; a great quantity of dust was

necessarily evolved from so many stones, and there was scarcely any circulation of air to carry it away. Unfortunately, the steam engine, unlike the stream which formerly supplied his wheel, allowed him no season of relaxation for the recovery of his health. He worked ten or eleven hours a day on an average. If, then, the grinder's asthma were a disease of not infrequent occurrence before, it is probable that its frequency would have been much increased now. Such, indeed, was the fact; and it is at the present time become so general that out of 2,500 grinders there are not 35 who have arrived at the age of 50 years, and perhaps not double that number who have even reached the age of 45. There are above 80 fork-grinders exclusive of boys, and I am informed that there is not a single individual amongst them 36 years old.

The healthy conditions under which employments were carried on in Sheffield in the middle of the eighteenth century, as portrayed by Sir Arnold Knight, receives curious corroboration from a writer in 1769,† a medical practitioner resident in this city—namely, Dr. Buchan, the author of *Domestic Medicine*, a widely circulated work, in which he says:

It may seem romantic to recommend gardening to manufacturers in great towns; but observation proves that the plan is very practicable. In the town of Sheffield, in Yorkshire, where the great iron manufacture is carried on, there is hardly a journeyman cutler who does not occupy a piece of ground which he cultivates as a garden. This practice has salutary effects. It not only induces these people to take exercise without doors, but also to eat many greens, roots, etc., of their own produce which they would not think of purchasing. There seems to be no reason why manufacturers in any other town in Great Britain should not follow this example.‡

In 1843, Dr. Calvert Holland, another Physician to the Infirmary, published in book form[§] his extensive and elaborate observations on the same subject, which he had carried on for several years, setting forth clearly the mechanical part the dust and metallic particles played in the production of the disease. To Dr. Holland belongs the merit of recognizing the kind of ventilating apparatus required, and of urging its adoption; the skill of engineers has, since his day, given practicability to his suggestion.[¶]

Dr. C. Holland was a most intelligent observer, and even in these days would be regarded as an extensive as well as a versatile writer. In 1843 he made careful inquiries into each branch of labour followed in Sheffield, noting the social conditions, ages at which work was commenced, educational attainments, scale of wages, and relative mortality, etc. His results showed that each principal department of the Sheffield trade had its own special health conditions and rate of mortality. The one pre-eminent for its destructiveness to life was fork-grinding.

The grinder accepted his calling and became indifferent to the future, regarding his fate as an unavoidable incident. This is illustrated in the following lines of Sheffield's own bard, Ebenezer Elliott, well known as the Corn Law Rhymers.

There draws the grinder his laborious breath,
There, coughing, at his deadly trade, he bends.
Born to die young, he fears nor man nor death;
Scorning the future, what he earns he spends:
Debauch and riot are his bosom friends.

Village Patriarch, Book v, 4.

The President, Dr. C. F. Favell, of this Association, when it met in this city in 1845, treated, too, of grinders' phthisis in his presidential address. Dr. J. C. Hall, in 1857, discussed the same subject[¶] extensively, and so have others, many of whom are still living, until now even, when Dr. Scurfield, medical officer of health in the present

* It may be remembered, however, that theirs was no enviable lot. If not liable to grinder's asthma in the times when the "dairy maid," as they called the water-wheel, was their motive power, they yet might at any moment be maimed or killed by a defective stone flying. The following is a song, very popular at grinders' festivals, of which the refrain was, "There's few suffer such hardships as we poor grinders do":

In summer time we can't work till water does appear,
And if this does not happen, the season is severe;
Then our fingers are numb'd by keen winter frosts or snow,
And few can brave the hardships that we poor grinders do.

When war is proclaimed our masters quickly cry,
"Orders countermanded, our goods we all lay by;
Our prices we must settle, and you'll be stinted too,"
There's few suffer such hardships as we poor grinders do.

There seldom comes a day but our "dairy maid" goes wrong,
And if that does not happen, perhaps we break a stone,
Which may wound us for life, or give us our final blow—
For there's few that have such hardships as we poor grinders do.

R. E. LEADER: *Sheffield in the Eighteenth Century*, p. 40.

† Dr. Buchan, born in 1729, received his medical education at Edinburgh. He settled in Sheffield, living in the house afterwards occupied by Montgomery, the poet, for some years, leaving in 1766 for Edinburgh, where he later (1769) published his book on *Domestic Medicine* at the price of 6s. This work, for that period, had an enormous circulation in England, America, and on the Continent, and it passed through about thirty editions, the last that I know of being in 1854 (an American edition). He sold the copyright for £700, and it is said that the purchaser received more than that sum as profit for each subsequent year. He left Edinburgh for London in 1778, where he died in 1805, and was buried in the cloisters of Westminster Abbey. He was the author of several other works.

‡ The paragraph continues as follows: "Mechanics are too much inclined to crowd into great towns. This situation may have some advantages; but it has many disadvantages. All mechanics who live in the country have it in their power, and indeed most of them do, occupy a piece of ground which not only gives them exercise but enables them to live more comfortably. So far at least as our observation reaches, mechanics who live in the country are far more happy than those in great towns. They enjoy better health, live in greater affluence, and seldom fail to rear a healthy and numerous offspring." This custom on the part of artisans to have their own gardens has more or less continued to the present day, but with the enlargement of the city they have had to go farther afield for their plots of land, and the proportion of these to the general working population is very considerably less, and is decreasing.

SIMEON SNELL.

70, HANOVER STREET,
GLOSSOP ROAD,
SHEFFIELD.

At Home:
9.30 to 10.30 a.m.
2 to 4 p.m.

Sept. 18, 1908.

Dear Mr Fremantle,

I have Sir Arnold Knight's pamphlet and the books you kindly lent me ready to return to you. Kindly let me know how I shall send them. I hesitate to send them through the post without your consent. I am greatly obliged for the loan of them.

I am sending by the same post a copy of my Address as President of the British Medical Association. I thought you would like to keep a copy in your collection.

With kind regards & thanks,

Very truly yours,

Simeon Snell

W T Fremantle, Esq,

Rotherham.



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year, states that were it not for industrial phthisis, the mortality from consumption would be less in Sheffield than in other large towns, and in his last annual report it is shown that 118 men died, including grinders, of course, owing to bad industrial conditions. After the 90 years, however, that have passed since Sir Arnold Knight drew attention to grinders' lung disease, the reports of successive medical officers of health testify that it still remains a dangerous occupation, and, in spite of the improved conditions under which grinders and cutlers work, much in that direction requires yet to be done.

Another subject closely connected with the industries of this city has been that of lead poisoning, especially among file cutters. The late Dr. J. C. Hall recorded his observations on this matter in 1865, and within recent years a Home Office inquiry was held in the city, at which evidence was given which has led to the issuing of regulations for the better conducting of the trade. This is an industrial disease, work on which has been carried on by others still living and active amongst us.

The part Sheffield has played in this most important field of medical inquiry, as to industrial diseases, was recognized, too, in 1876, when this Association held its last meeting here, and special attention was then directed to diseases associated with different industries, and several papers of interest and value were read. In continuation of the same spirit a section devoted to industrial diseases has been included in our present programme, and it is pleasing to mention that it will be presided over by Dr. Thomas Oliver, who has done so much of practical value in this direction and has so enriched the literature pertaining to this very important subject.

My own work in the domain of industrial diseases has naturally been in connexion with affections of the eye, but in the course of these investigations I have been led to make observations on the general health as well as on vision, and notably has this been the case as regards miners, and the workers with di-nitro-benzol, a material which is used in making flameless explosives.

This, the centre of the iron and steel industry, as well as one of the largest coal-producing parts of the kingdom, has afforded many opportunities for the study of eye diseases and accidents in relation to industrial occupations. Thus, from time to time, I was enabled to investigate many occupations, mostly associated with this district, and the results of these observations were from time to time recorded. They may be conveniently mentioned here under the following heads:

1. Diseases due to occupations involving prolonged use, or excessive strain, of the eyes and their muscles, such as nystagmus in coal-miners and in other employments.

2. Those due to occupations which involve the use of certain poisonous substances, such as di-nitro-benzol, used in making explosives, and of bisulphide of carbon, and others.

3. A consideration of the effects on the eye of occupations involving exposure to excessive light or heat or both, such as burnishers, steel smelters, electric welders, bottle makers, etc.

4. Injuries or accidents amongst grinders, iron and steel workers, coal miners, etc.

The above are but the headings of investigations extending in some instances over many years, necessitating the examination of large numbers of men, and of a more or less intimate knowledge of many industries. The last-mentioned, relating to eye injuries and accidents, clearly showed that many of the accidents were preventable. The wearing of protectors by the men in many instances was necessary, and assistance could further be derived from a rearrangement of the work—for instance, the chipping of castings should be carried on against a sheeting or wall, and not in such a way that passers-by or fellow workmen would be liable to injury. For these purposes—especially the use of protectors—the co-operation of masters and men was essential. In practice it was found more easy to obtain the assistance of the employers than of the operatives, who, with their true-born British spirit, resent interference with their liberty—even if such liberty be to their detriment. I cannot further deal with this subject here, but the prevention of eye accidents is an important and interesting one.

I purpose now to allude only to one of the occupation

diseases to which I have referred—namely, nystagmus, or oscillation of the eyeballs, so frequently met with in coal miners—and, now that it has been scheduled under the Workmen's Compensation Act, it has become a matter of greater pecuniary importance both to masters and to men. It is many years now since I made the observation that has proved to be the essential part in the etiology of the affection—namely, that the cases coming under one's notice were in men working in a constrained position. At that time little had been written and little was known about the disease. Its full and thorough investigation needed an acquaintance with coal mining, theoretical and practical; the latter was obtained by visits to coal mines, and the former by many interviews with mine managers and men, who were only too willing to aid in this line of research. It suffices here to mention that all I learnt then, and which subsequent experience and investigation has confirmed, was that the prime cause of the oscillations of the eyeball was the weariness of the elevators induced by the constrained position of the body and eyes, which the miner was compelled to assume whilst engaged in certain descriptions of work in the mine. The most conspicuous of this kind of labour is that known as "holing," to effect which the collier undercuts the seam of coal, proceeding so far that it becomes necessary for him to gradually draw his body more or less under the coal. The whole manner of work underground, however, necessitates a more or less similar disposition of the eyes, especially in those mines where the roadways and working places are too low to allow of men standing upright at their work, or, where they can do so, the examination of the roof would still require the frequent casting up of the eyes and the strained use of the elevator muscles.

It has been a contention how far the frequency of the disorder has been affected by the indifferent illumination afforded by the safety lamps, or other means of lighting employed in the mine. But nystagmus is found with all kinds of illumination underground, where electric light or large oil lamps affording abundant light have been employed. Its total independence of indifferent illumination was, moreover, definitely proved by the observation of many cases in occupations above ground necessitating a similar over-use of the elevators, in which the men pursued their work either in ordinary daylight or with artificial light of which no complaint could be made. The mining industry is conspicuous, however, in the opportunity it affords for the production of nystagmus, and it must be regarded as essentially a disease of coal miners. There was some hope that the introduction of coal-cutting machines would tend either to prevent or lessen the frequency of the disorder, but the comparatively small number at present employed do not appear to have materially lessened the frequency of the occurrence of the affection, nor has the improved illumination of recent times had much influence. The difficulty lies in the methods at present deemed necessary for working mines and the examination of the roof, or getting coal at the coal-face. To make all the roadways of sufficient height to allow of the men easily travelling upright to the coal-face would be costly and probably financially prohibitive in many mines, but even this outlay would not relieve the miners from the statutory obligation to frequently examine the roof of the working place, or the holer from his constrained position, or the casting up of the eyes of the workmen in all working places, and this latter operation would be intensified in proportion to the thinness of the seam.

This brief statement of a subject which I have dealt with at length on many other occasions for several years past has been necessary, as it was requisite to remind my hearers of the nature as well as the cause of miners' nystagmus before proceeding to refer to a subject which bears relation to it in a most important manner.

The detection of firedamp is a matter of vital concern to all engaged in a coal mine. I wish now to refer to a series of hitherto unpublished observations which were made some years ago as to the detection of this dangerous gas in the air of coal mines, and the approximate percentage present in the air current of the mine.

The ordinary method adopted for the detection of firedamp in coal mines is by reducing the size of the oil flame of the safety lamp until the luminosity almost disappears, and the firedamp then, if present, appears as a pale blue flame or "cap" above it, this "cap" being due to the

presence of gas in the air. The amount of gas present can be approximately estimated by the appearance and dimensions of the "flame cap." The oil flame method does not clearly detect less than 2 to 3 per cent., but for some purposes it is desirable to recognize a smaller quantity even than 2 per cent. It will therefore be readily understood how necessary it is that with the ordinary methods indications of the presence of gas should be at once recognized.

The class of men in a mine who are chiefly responsible for seeing that the pit is free from dangerous quantities of gas are those called "deputies" or "firemen." It is part of their duty to visit the "workings" before the colliers go to their work, and during their working shift, to ascertain what, if any, gas be present, and to record the result of their examination in the official report book. Throughout their regular day's work they are constantly on the lookout for any indication of firedamp. In my writings from time to time I have particularly mentioned the presence of nystagmus among this class of underground worker.

For long it was my opinion that the apparent dancing of the safety lamps which forms such a prominent symptom of miners' nystagmus would, in especially well-marked instances, be a hindrance to the delicate detection of the "cap" spoken of as indicating the presence of gas. It has been a matter that has frequently been a topic of conversation between myself and my friends among mine authorities, and the importance of the subject has been recognized by them. My interrogation also of "deputies" afflicted with nystagmus showed me long since that there was in reality the interference I had anticipated, in some cases, at all events. One deputy in particular, who was suffering from nystagmus, told me that it did undoubtedly hinder the accurate estimation of the presence of a cap, and that this became more marked as the day wore on at his work. An official in the management of a colliery, in course of conversation, stated that he knew a deputy who was the subject of nystagmus. When he was in the mine he frequently saw this man. My friend undertook to ascertain for me this deputy's capacity for detecting firedamp in the mine as opportunity offered, and in such a way that would not lead the deputy to think that he was being tested. These points he carried out, and I append his account:



Fig. 1.—To show a gas-cap over the lamp flame. (Photo.)

The deputy and I had been travelling on a low length of faces, and came to a gate (roadway) in which we suspected the presence of gas—in fact, could detect it by its smell. He raised up his lamp to the roof, and a "cap" began to show upon the top of the flame. He, however, continued to raise his lamp until the flame lengthened out, and then said, "See there it is." I then lifted up my lamp, and asked him to speak as soon as the flame began to show the cap. The result was the same as with his own lamp, for he could not see it until the flame began to lengthen out to a considerable extent, and never noticed the first signs of the presence of gas. I may say that about a minute before he had complained of dizziness, which he said came upon him when he knocked about.

There were other cases which I need not here allude to. Some time later I decided to test practically a number of those suffering from nystagmus as to their capacity to recognize the "gas-cap" over the flame of a safety lamp. All the patients tested were those who had come for treatment among my out-patients at the Royal Infirmary, and were therefore in no way selected. They were all suffering from nystagmus sufficiently to incapacitate them from following their employment. In my investigation I received most valuable assistance from Mr. A. H. Stokes, H.M. Inspector of Mines. He kindly discussed with me the best way of carrying out the investigation, and on two occasions examined men with me. The ophthalmoscopic dark room, with black walls, in my out-patient department at the Royal Infirmary, was used for the examination of the men, and coal gas was communicated by a tubing to the safety lamp.

The patient was allowed to remain in this perfectly dark room with only a safety lamp as a light. When he had remained sufficiently long to accustom his sight to the semi-darkness, or, as the miners term it, "get his sight," he was subjected to the test. An india-rubber tube was

attached to the ordinary gas-burner, and when ready the gas was directed to the reduced flame of the safety lamp and regulated so as to either give a very small gas-cap or to fill the gauze with blue flame indicative of gas. In fact, the gas was slowly increased until the patient either recognized the cap or the gauze was full and it was not wise to continue the experiment.

There is probably no method of work in a mine more calculated to intensify or give rise to nystagmus than that of holing or undercutting the coal, and although such workmen are not immediately concerned in examining the workings for gas, yet it was considered interesting to test the ability of such workmen for making the test.

The dark room was so large that it allowed space for a man to assume the position and action usually followed by miners in holing or undercutting the coal, and after being placed in this attitude for a sufficient time the patient was directed to stand up, and was then tested with the gas-cap. In most cases the test was made with the safety lamp in a position horizontal to the patient's eyes, but was occasionally raised, as would be the case when a miner was examining for gas at the roof of the mine. I need not weary you with the details of each examination. It will suffice to summarize the general results.

Forty-eight miners, from thirteen different collieries, were examined, and their incapacity to detect a "gas-cap" unless a dangerous amount of gas was present was very marked in all. One did not see a big "gas-cap," as he said the lamp was "spinning too much"; another did not see a small cap at all, but when he had steadied his eyes he recognized a 1-inch cap. Another could not see a cap because the lamp appeared to be all jerking about, but when the eyes became steadied and the lamp ceased to spin round he could recognize a gas-cap. Another, in whom the nystagmus was slight, could only see a large cap. Another, in whom the nystagmus was very marked, reeled like a drunken man when rising from the position on the floor he had assumed as for work. The lamp was full before he detected a cap. In another the whole lamp appeared to be "swinging round," and he could see no cap until the lamp was full of blue flame. There were several who saw either only a large cap or a moderate-sized cap when they had steadied themselves.

The method of steadying the eyes spoken of consisted of resting the eyes by turning them directly downwards, when the oscillations ceased or became much less marked. Thus, another man could not see a small cap when the lamp was "moving" but could do so after the eyes were steadied, and he volunteered the remark that when at work he could only see a cap after he had sat down and steadied himself. In the pit, whilst working, it would take a much longer time for the eyes to be steadied than it did during my examination.

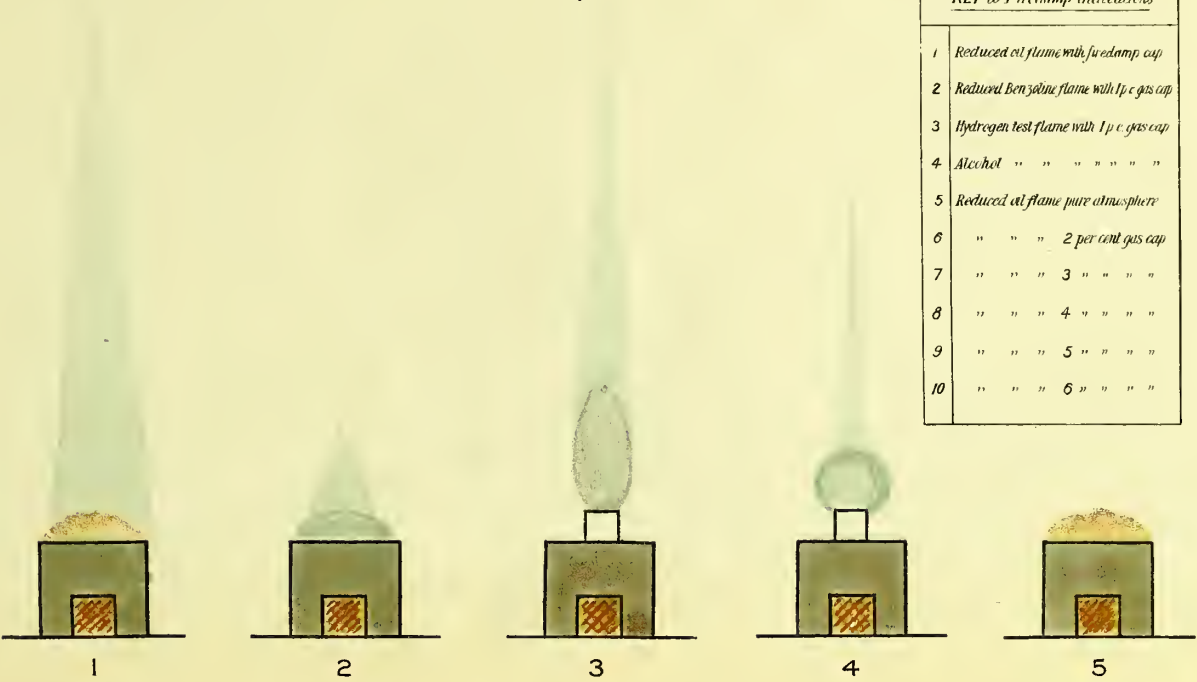
Another was unable to see even a large cap until his eyes became steadied. He said himself that he was not to be trusted at testing for gas in the mine. Another could only detect a cap when the lamp was full of blue flame. Another could not tell when gas was in the lamp and when not, that is, when the coal gas supply was turned on or off.

The majority could not see even a large cap. Nine were tested with the more delicate alcohol flame lamp, and all failed to detect a cap at all. The whole investigation sufficiently demonstrated to my satisfaction that a miner suffering from nystagmus was unreliable as a detector of the presence of gas in the mine.

I am not aware of any inquiries, after explosions, having been made as to the vision of those responsible for ascertaining the presence of gas in dangerous quantities, and it is true that when lives are lost the deputy is as likely, or more so, to be a victim as are others. It remains to be seen if later observers will corroborate the investigations I have now set forth, and possibly on a larger scale. At present the information I have given you suggests the need for a periodical medical examination of officials, and, in the case of a colliery explosion, an inquiry into the visual condition of those responsible for ascertaining whether gas has been present in dangerous proportions or not.

TO ILLUSTRATE MR. SIMEON SNELL'S PRESIDENTIAL ADDRESS.

KEY to Firedamp indications	
1	Reduced oil flame with firedamp cap
2	Reduced Benzolene flame with 1 p.c. gas cap
3	Hydrogen test flame with 1 p.c. gas cap
4	Alcohol " " " " " "
5	Reduced oil flame pure atmosphere
6	" " " 2 per cent gas cap
7	" " " 3 " " " "
8	" " " 4 " " " "
9	" " " 5 " " " "
10	" " " 6 " " " "



NOTE. - Gas Caps are increased or diminished in size by the nature of illuminant used, and size of testing flame. The standard Hydrogen flame is 10m.m. which for 1 per cent. gives a gas cap of 22m.m. In the above diagram, a 15m. Hydrogen flame is given showing a 60m.m. gas cap.
The Standard Alcohol Flame is 13m.m. which for 1 per cent. gives a gas cap of 25m.m., as shown in the diagram."



Accounts of colliery disasters frequently show that the fireman is among the victims, and commonly the newspaper report runs something in this way: "Men were exploring the workings when an accumulation of gas exploded, enveloping the group."

I have also a newspaper report of a deputy who was brought before a bench of magistrates for not having made a proper investigation, whereby he omitted to discover the presence of gas in a certain working place. A penalty was inflicted. A witness gave evidence to the effect that he found gas after the defendant had previously inspected the place. It would have been interesting, if it had been possible to have made an examination of the defendant's eyes, to have ascertained whether or not nystagmus was present. My investigations lead me to suspect that it might have been less negligence than incapacity, owing to the apparent movements of the lamp, which led to his failure to detect a gas-cap.

Perhaps the position may be better understood if one describes shortly how a miner with nystagmus sees a safety lamp, or, for that matter, any other object. The oscillations of the eyeballs give him the impression that the object looked at is in motion; thus, he sees his safety lamp as if it was moving or "dancing," as he expresses it. The motions, of course, bear a corresponding relation to those of the eyeball. They will be more rapid if the oscillations are rapid; and, as these motions may vary from 100 to anything up to, say, 350 in a minute, the apparent movements of the safety lamp may be very quick indeed, producing little more than the appearance of a light blur. The oscillations may be to and fro, rotatory, or the two combined, and a miner frequently describes the safety lamp as appearing to move rather more in an ellipse than in a circle. I wished to reduce this to as much a graphic representation as possible. This has been done by a series of photographs. There are great difficulties in the way, which need not be referred to here.

The first thing to decide was, Should the safety lamp be taken moving? This was decided against; as a fact, the miner's lamp does not move. But the photographic plate was held to represent the oscillating eyeball, and was therefore made the moving object. The lamp was suspended, steady and fixed, as it might be in the mine. The photographs were taken with carefully recorded rates of movements, and the mechanical apparatus permitted of to and fro and rotatory movements, or the two combined, being represented.

For the present I have been obliged to give up the attempt to secure satisfactory photographs illustrating the rotatory combined with the to and fro movements. Through the kindness of my friend, Mr. A. H. Stokes, I have, however, been able to obtain an excellent photograph of the to and fro motions. In one photograph (here given) the camera is stationary, and in the other it is making 150 to and fro movements in a minute, the said motions being limited to $\frac{1}{2}$ in. on either side. The blur of the flame is readily observed, and the difficulty of detecting a delicate blue gas-cap will be understood.

Of course, at the best such photographs can only give

an idea as to the indistinctness occasioned to the miner by the apparent movements of the lamp, and are not intended to convey an exact representation of what is actually observed by him.

Before I close, may I draw yet another comparison between the work of the Association to-day and that at the time of the last meeting in this city?

In 1876 there were but four Sections, now there are seventeen, and even this number does not embrace the whole of the subjects to which, in some quarters, it was desired that Sections should be devoted. This, as I understand it, is but an evidence of the remarkable progress that has taken place in all branches of medicine and surgery.

Here, in a teaching university, anatomy, physiology, and pathology naturally find their places; the latter, however, is a subject which, in its modern conception, is one little dreamt of when our predecessors were meeting previously in this city, and yet with its handmaid, bacteriology, how it has pervaded the whole of medicine and rendered possible many of the most notable advances in the diagnostic and curative aspects of our profession!

Medicine, during this period, has on its side made steady progress, consolidating and perfecting its knowledge and reaching forward into domains formerly beyond its ken.

Surgery has known probably its most brilliant period. It suffices to mention brain surgery and abdominal surgery. Who could have conceived the possibility, even in 1876, of removing brain tumours with safety to life, or that the abdomen would yield such a rich surgical field and such brilliant results that so happily follow? It was even later than the time of which I speak that a distinguished surgeon, since deceased, stated that surgery had reached its limit, and yet I have but mentioned two of the lines on which surgery has advanced.

And what has made these and many other hitherto unheard of surgical procedures not only possible but, on the whole, so successful, but the better understood and more widely appreciated methods of antisepticism and asepticism for which all the world is indebted to the teaching of Lord Lister?

Have the public realized that millions of lives have already been saved in all quarters of the world by his researches and their practical results? Daily, and even hourly, to the remotest parts of the globe, are the benefits due to his sagacity being made use of. He has been honoured by his Sovereign, but his greatest privilege has been that his life has been spared to see for himself the fruits of his labours and to know that he will leave a name as imperishable as any among the immortals.

Milton said, with truth,

Peace hath her victories
No less renowned than War.

The late Lord Beaconsfield, too, far-seeing above his fellows, remarked at the Guildhall banquet in 1875:

I believe that a policy that diminishes the death-rate of a great nation is a fact as considerable as any of those great decisive battles of the world that decide nothing.

The immense advantages to the general surgeon of

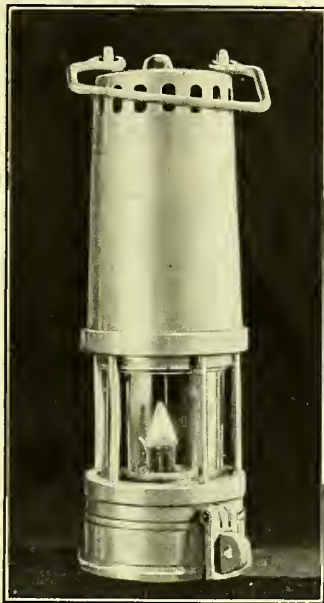


Fig. 2.—Safety lamp, photographed with the camera stationary.



Fig. 3.—A photograph of the same safety lamp as Fig. 2, but with camera moving to and fro 150 times in a minute.

asepticism has been shared in to a no inconsiderable extent by the ophthalmic surgeon. Operations are more successful, the proportion of success is greater, for though the same delicate manipulative skill is still as essential as ever, the most scrupulous cleanliness and aseptic precautions which have resulted from Lister's teaching have, in a large proportion of cases, banished suppuration, which in other days dogged the most carefully-performed operation. To mention cataract extraction alone, the successful results have gone up from considerably below 90 per cent. to, in many hands, a small number only below the 100.

I speak not here on the difficulties in eye cases of securing as complete asepsis as is possible with the surgeon, but if nothing more had been gained than the knowledge that the most perfect cleanliness attainable was essential, not only as to the instruments and field of operation, but in all the patient's surroundings, whether it be in the operation theatre or ward, then alone the boon bestowed on ophthalmic patients has indeed been a great one. I speak as one who knew something of the pre-Listerian period in general and ophthalmic surgery.

In 1876, the time of the last meeting, ophthalmology was under the influence and still feeling the benefits of the teaching of Bowman, Graefe, and Donders, who, together with Helmholtz, the physicist, must be considered the makers of ophthalmology as known in modern times. There have since that time been no operations chronicled in ophthalmology to rival that of ophorectomy

at one time and appendectomy at another, in the domain of surgery.

To mention further the lines of progress would be wearisome and out of place. The knowledge, however, of errors of refraction and their causal relation to many nervous conditions may be set forth as a notable advance. And yet it is but a few years since the scoffer was heard deriding such a relation or minimizing its importance. Is it a small matter that, to millions of sufferers from recurring headaches, a fuller and better understanding of the bearing of ocular conditions as a cause, and a more careful adjustment of their refraction errors or muscle balance, in competent hands, has brought comfort and relief?

Such is a brief review of some of the changes which have occurred in medicine, surgery, and ophthalmology since the Association met here on the last occasion. It is necessarily brief and very incomplete, as the address has dealt with other topics.

I will conclude by again according to each of you a very cordial welcome to this city.

REFERENCES.

- ¹ On Grinders' Asthma, *North of England Medical and Surgical Journal*, 1830, vol. 1, pp. 174-5.
- ² A paper on Grinders' Asthma, read before the Medical and Surgical Society of Sheffield, September 1st, 1819.
- ³ *Diseases of the Lungs from Mechanical Causes, and Inquiries into the Conditions of the Artisans exposed to the Inhalation of Dust*, J. T. Arlidge, *Diseases of Occupations*, p. 339.
- ⁴ From R. E. Leader's *Sheffield Disease*.
- ⁵ On the Prevention and Treatment of the Sheffield Grinders' Disease.
- ⁶ Miners' Nystagmus and Testing for Firedamp, *BRITISH MEDICAL JOURNAL*, 1893, vol. 1, p. 1002.

APPENDIX.

Nystagmus Cases Tested for "Gas Cap."

No.	Initials.	Age.	Occupation.	Ability to Pass Test.	Remarks.
1	G. T.	38	Coalgetter ¹	He could not see even a large "cap"	He said the lamp was "spinning too much" for him to see the "cap."
*2	J. P.	36	Deputy (an official of the mine)	He could not see even a large "cap"	Could not see the cap while the lamp was "spinning." He said when at work it would be impossible for him to see one. Everything appeared to move about so much.
3	C. H.	25	Coalgetter	He could see large "cap" only	He did not see a small cap at all, as the lamp was "spinning too much." When his eyes became steady he saw one, which he defined as 1 inch in height, when the lamp was full of blue flame.
4	A. B.	49	Coalgetter	He could see no "cap" until he had rested his eyes	Suffered from symptoms of nystagmus for 3 years, but has been worse for the last 5 or 6 weeks.
5	J. C.	31	Coalgetter	He only saw large "cap"	
6	D. V.	25	Coalgetter (miner, 12 years)	He only saw large "cap"	Nystagmus not very marked, but has suffered for about 8 years.
7	H. V.	56	Coalgetter (miner, 46 years)	He detected no "cap" until the lamp was full of blue flame	Father of previous case. Nystagmus 2 years. Very bad last 9 months. After rising from his working posture he reeled like a drunken man.
8	E. S.	30	Coalgetter	He only saw large "cap"	Nystagmus marked. Complained of it for 14 months.
9	W. D.	26	Coalgetter	He could only see "cap" when lamp was full of blue flame	Nystagmus marked. Complained of it 4 or 5 months. Said the whole lamp was "swinging round."
10	A. B.	51	Check weighman	He saw moderate-sized "cap" only after steadying eyes	Has not worked for 9 months.
11	W. B.	25	Coalgetter	He saw large "cap" only after he had steadied himself	Son of previous case. He could see a small "cap" when he had steadied himself, but before steadying himself he could not see even a large one.
12	F. F.	29	Coalgetter	Could not at first see moderate-sized "cap"	This is an old patient, having been under observation 2 years previously. Nystagmus induced now with difficulty. He could not at first see a moderate-sized cap, but when he had steadied himself and the lamp appeared stationary he detected a "small cap."
13	J. W. T.	44	Coalgetter	He could only see a "cap" after steadying himself	A slight case. The oscillations were made evident by prolonged work. While the lamp appeared to move he could not see a small cap, but when the oscillatory movements had subsided he was able to do so. He volunteered the remark that when he was at work he could only see a "cap" after he had "steadied himself." It would, however, take longer to get the eyes steady when working in the mine.
14	A. C.	43	Coalgetter 22 years (miner, 33 years)	He only saw a very large "cap"	Suffered from his eyes more or less for 5 or 6 years. Much worse last few weeks; not able to do work. The oscillations are rapid, and become more marked after assuming position for work. He can steady the eyes by turning them directly downwards.
15	C. S.	48	Coalgetter	He only saw a large "cap"	After being put in position for work he could not see a small "cap," the lamp was spinning so much. He says that if his eyes were on the "dance" as they are when he is at work, he could not detect gas, unless the quantity was very large, unless he first steadied his eyes. He says after he has been working and has then steadied his eyes he could not detect such a small "cap" as a man with good sight could do.
16	W. S.	36	Coalgetter (10 years)	The safety lamp had to be full of blue flame before he saw a "cap"	Suffered from his eyes more or less for 5 years; worse last few weeks. Nystagmus very marked.
17	W. C.	38	Coalgetter, 14 years (miner, 27 years)	He could not see a large "cap"	Suffered from symptoms of nystagmus for 6 years. Away from work this time 7 weeks. Said himself he was not to be trusted for testing for gas in the mine.

The term "coalgetter" is used in a general sense, and men includes all working at the coal face.

Nystagmus Cases Tested for "Gas Cap" (continued).

No.	Initials.	Age.	Occupation.	Ability to Pass Test.	Remarks.
*18	J. B.	60	Coalgetter	Large "cap" only. Small "cap" after steadying eyes	
19	J. I.	35	Coalgetter	He was only able to see a large "cap"	
20	E. B.	39	Coalgetter, 5 years (miner, 21 years)	He could not distinguish "cap" even when lamp was full of blue flame	Nystagmus not very noticeable unless patient stoops and directs his eyes upwards. Then it is very marked.
*21	J. W.	40	Coalgetter, 20 years (miner, 28 years)	He could not see even a large "cap"	
*22	W. R.	21	Filler, 5 years	He could only see a large "cap"	Though called a filler he occupies part of his time in coal-getting. He was unable to see even a large "cap" until he had looked for some time and, as he said, the eyes had steadied themselves.
*23	W. W.	42	Coalgetter, 20 years	He failed to recognize a large "cap"	Nystagmus marked.
*24	H. R.	42	Coalgetter, 33 years	He could not see even a large "cap"	Oscillations of eyeballs very marked.
25	W. B.	53	Coalgetter, 36 years	Failed to detect even a large "cap."	Not worked for 2 weeks.
26	G. H.	32	Coalgetter	Failed to detect even a large "cap."	
27	H. A.	31	Coalgetter (miner 18 years)	Failed to detect even a large "cap."	
28	W. D.	30	Coalgetter	Failed to detect even a large "cap."	
29	W. B.	43	Coalgetter, 20 years	Could not detect even a large "cap."	Suffered from his eyes for 2 years; much worse last 6 weeks.
30	G. J.	35	Coalgetter, 15 years	Could not detect even a large "cap."	Suffered from his eyes for 9 years; much worse last 6 weeks.
31	S. S.	41	Coalgetter, 8 years	Could not detect even a large "cap"	Eyes affected for 13 years; very bad for a week or more; has tested for gas a good deal but was obliged to give up doing so.
32	R. D.	36	Coalgetter, 15 years	Could not detect even a good-sized "cap"	Eyes commenced to trouble him 8 years ago; more so during last 12 months and especially last 6 weeks. He has been aware of his incapacity to detect gas in the mine.
33	F. E.	39	Coalgetter, 16 years (miner, 20 years)	Failed to detect a fair-sized "cap"	Eyes affected 12 months. Severe nystagmus.
34	T. F.	41	Coalgetter, 20 years (miner, 30 years)	Very large "cap" not detected	Eyes affected 5 years, especially last 3 years; much worse last 4 weeks.
35	W. H.	32	Coalgetter, 9 years (miner, 14 years)	Could not detect large "cap"	Eyes troubled him 4 months; much worse 6 weeks.
36	J. P.	51	Coalgetter	Could not detect a good-sized "cap"	
37	G. B.	23	Coalgetter	Could not detect a good-sized "cap"	
38	A. G.	—	Coalgetter (miner, 23 years)	Could not detect a very large "cap"	Suffered from eyes 2 years; away from work for 1 month
39	W. H. C.	—	Coalgetter (miner, 26 years)	Could not detect a large "cap"	Eyes bad 8 weeks. He was unable to detect when the blue flame was in the lamp and when out.
40	T. W.	44	Deputy (coalgetter, 24 years, miner, 33 years)	Could not detect small "cap"	Eyes had 9 months; worse 6 weeks. He said that when at work in the mine he was unable to detect gas until he had steadied himself.
41	W. B.	44	Coalgetter, 10 years (miner, 29 years)	Could not detect a large "cap"	Eyes affected 6 months; worse 2 months; off work this time 2 weeks. The reason he gave for not seeing the "cap" was that the lamp was "spinning too much."
42	M. L.	40	Coalgetter, 20 years (miner, 25 years)	Could not detect a "cap"	Eyes affected 5 months. A severe case of nystagmus. He was unable to detect the presence of a "cap" over the flame, but was less certain when the "cap" was elongated to the top of the gauze in the lamp.
43	W. K.	45	Coalgetter, 17 years (miner, 25 years)	Could not detect a "cap"	The result in this case was similar to the last. In both the failure was more marked when the lamp was raised, so that, to see it, the gaze was directed above the horizontal line.
44	J. T.	53	Coalgetter	A 2 per cent. gas cap was not detected	Tested with alcohol flame lamp.
45	G. B.	49	Coalgetter	Could not see a large "cap"	Tested with alcohol flame lamp.
*46	H. H.	65	Coalgetter	Could not see a "cap"	
47	S. H.	59	Coalgetter		

Six of these were tested again on a subsequent occasion. A star (*) has been placed against them, and they are numbered as follows:

2. J. P.—Was tested several weeks after first test. When the "cap" was elongated to the top of the lamp he was able to detect the flame and the "cap" and to separate the two. He said the lamp was "spinning round," and he saw the yellow ball of light and a different colour above it. He was tested with the lamp raised above his head. He was considerably improved since he was tested previously.

18. J. B.—Was improved.

21. J. W.—He was still unable to see a "cap."

22. W. R.—He was tested with an alcohol flame lamp and was unable to detect a "cap."

23. W. W.—With alcohol flame lamp he was unable to detect 2 per cent. of gas.

24. H. R.—He was tested with both alcohol flame lamp and ordinary Davy lamp and was unable to detect 3 per cent. of gas.

46. H. H.—He had greatly improved, and detected a "cap" with fair correctness

It will have been noticed that in many cases the men have

stated that they could not see a "cap" until they had "steadied" their eyes. If the "cap" had been looked at while the eyeballs were oscillating it would not have been noticed by them. No. 14 (A. C.), for instance, said at first that he detected a small "cap," but further observation showed that he was putting his eyes in a position to steady them when looking at the lamp. When he was prevented doing this and the eyeballs were oscillating he was unable—as he said, owing to the lamp "spinning" so much—to see a "cap" at all until it became a very large one. A miner learns to steady his eyes by looking downwards.

The method of testing has been set forth on p. 244, and need not be repeated here.

Throughout these investigations I had at different times the assistance of the following—Drs. Cocking, Kerr and Rutherford, and Messrs. Arthur Connell and J. W. Stokes. Also, Mr. A. H. Stokes, H.M. Inspector of Mines, was present at the testing of a considerable number of them. On one occasion he brought an alcohol flame lamp with him, but the test was too delicate for any miner who failed to see a "cap" with the Davy lamp.

